S09b On the Disappearance of a Cold Molecular Torus around the Low-luminosity Active Galactic Nucleus of NGC 1097

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We used the Atacama Large Millimeter/Submillimeter Array (ALMA) to map the CO(3–2) and the underlying continuum emissions around the type-1 low-luminosity active galactic nucleus (LLAGN; bolometric luminosity $\lesssim 10^{42}$ erg s^{-1}) of NGC 1097 at ~ 10 pc resolution. These observations revealed a detailed cold gas distribution within a ~ 100 pc of this LLAGN. In contrast to the luminous Seyfert galaxy NGC 1068, where a ~ 7 pc cold molecular torus was recently revealed, a distinctively dense and compact torus is missing in our CO(3–2) integrated intensity map of NGC 1097. The gas mass of the torus of NGC 1097 would be a factor of $\sim 2-3$ less than that found for NGC 1068, which implies less active nuclear star formation and/or inflows in NGC 1097. Our dynamical modelling of the CO(3–2) velocity field implies that the cold molecular gas is concentrated in a thin layer as compared to the hot gas traced by the 2.12 μm H_2 emission in and around the torus. Furthermore, we suggest that NGC 1097 hosts a geometrically thinner torus than NGC 1068. Although the physical origin of the torus thickness remains unclear, our observations support a theoretical prediction that geometrically thick tori will become deficient as AGNs evolve from luminous Seyferts to LLAGNs.